



SEQUENCE LISTING

(1) GENERAL INFORMATION:

(i) APPLICANT: Pulst, Stefan M.

(ii) TITLE OF INVENTION: NUCLEIC ACID ENCODING SPINOCEREBELLAR ATAXIA-2 AND PRODUCTS RELATED THERETO

(iii) NUMBER OF SEQUENCES: 5

(iv) CORRESPONDENCE ADDRESS:
(A) ADDRESSEE: Pretty, Schroeder & Poplawski
(B) STREET: 444 South Flower Street, Suite 2000
(C) CITY: Los Angeles
(D) STATE: CA
(E) COUNTRY: USA
(F) ZIP: 90071

(v) COMPUTER READABLE FORM:
(A) MEDIUM TYPE: 3.5" diskette
(B) COMPUTER: IBM PC compatible
(C) OPERATING SYSTEM: PC-DOS/MS-DOS
(D) SOFTWARE: PatentIn Release #1.0, Version #1.25

(vi) CURRENT APPLICATION DATA:
(A) APPLICATION NUMBER: 08/727,084
(B) FILING DATE: October 8, 1996
(C) CLASSIFICATION:

(viii) ATTORNEY/AGENT INFORMATION:
(A) NAME: Viviana Amzel, Ph. D.
(B) REGISTRATION NUMBER: 30930
(C) REFERENCE/DOCKET NUMBER: P07 37217

(ix) TELECOMMUNICATION INFORMATION:
(A) TELEPHONE: 213-622-7700
(B) TELEFAX: 213-489-4210

(2) INFORMATION FOR SEQ ID NO:1:

(i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 516 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: both
(D) TOPOLOGY: both

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

TTGGTAGCAA CGGAAACGGC GGCGGCCGT TTGGCCCGG CTCCGGCGG CTCCTGGTC	60
TCGGCGGGCC TCCCCGCCCC TTCGTCGTCG TCCTTCTCCC CCTCGCCAGC CGGGCGCCC	120
CTCCGGCCGC GCCAACCCGC GCCTCCCCGC TCGGCGCCCG TGCGTCCCCG CCGCGTTCCG	180
GCGTCTCCTT GGCGCGCCCG GCTCCCGCT GTCCCCGCCG GGCGTGCAG CCAGTGTATG	240
GGCCCCTCAC CATGTCGCTG AAGCCCCAGC AGCAGCAGCA GCAGCAGCAG CAACAGCAGC	300
AGCAGCAACA GCAGCAGCAG CAGCAGCAGC AGCCGCCGCC CGCGGCTGCC AATGTCCGCA	360
AGCCCGGCCGG CAGCGGCCTT CTAGCGTCGC CCGCCGCCGC GCCTCGCCG TCCTCGTCCT	420
CGGTCTCCTC GTCTCGGCC ACGGCTCCCT CCTCGGTGGT CGCGGCGACC TCCGGCGCG	480
GGAGGCCCGG CCTGGGCAGG TGGGTGTCCG CACCCCC	516

(2) INFORMATION FOR SEQ ID NO:2:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 4481 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: both

(ii) MOLECULE TYPE: cDNA

(ix) FEATURE:

- (A) NAME/KEY: CDS
- (B) LOCATION: 163..4101

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

ACCCCCGAGA AAGCAACCCA GCGCGCCGCC CGCTCCTCAC GTGTCCCTCC CGGGCCCGGG	60
GCCACCTCAC GTTCTGCTTC CGTCTGACCC CTCCGACTTC CGGTAAAGAG TCCCTATCCG	120
CACCTCCGCT CCCACCCGGC GCCTCGGCCGC GCCCGCCCTC CG ATG CGC TCA GCG Met Arg Ser Ala	174
1	
GCC GCA GCT CCT CGG AGT CCC GCG GTG GCC ACC GAG TCT CGC CGC TTC	222
Ala Ala Ala Pro Arg Ser Pro Ala Val Ala Thr Glu Ser Arg Arg Phe	
5 10 15 20	
GCC GCA GCC AGG TGG CCC GGG TGG CGC TCG CTC CAG CGG CCG GCG CGG	270
Ala Ala Ala Arg Trp Pro Gly Trp Arg Ser Leu Gln Arg Pro Ala Arg	
25 30 35	

CGG AGC GGG CGG GGC GGC GGT GGC GCG GCC CCG GGA CCG TAT CCC TCC Arg Ser Gly Arg Gly Gly Ala Ala Pro Gly Pro Tyr Pro Ser	40	45	50	318
GCC GCC CCT CCC CCG CCC GGC CCC GGC CCC CCT CCC TCC CGG CAG AGC Ala Ala Pro Pro Pro Pro Gly Pro Gly Pro Pro Ser Arg Gln Ser	55	60	65	366
TCG CCT CCC TCC GCC TCA GAC TGT TTT GGT AGC AAC GGC AAC GGC GGC Ser Pro Pro Ser Ala Ser Asp Cys Phe Gly Ser Asn Gly Asn Gly Gly	70	75	80	414
GGC GCG TTT CGG CCC GGC TCC CGG CGG CTC CTT GGT CTC GGC GGG CCT Gly Ala Phe Arg Pro Gly Ser Arg Arg Leu Leu Gly Leu Gly Pro	85	90	95	462
CCC CGC CCC TTC GTC GTC CTT CTC CCC CTC GCC AGC CCG GGC GCC Pro Arg Pro Phe Val Val Leu Leu Pro Leu Ala Ser Pro Gly Ala	105	110	115	510
CCT CCG GCC GCG CCA ACC CGC GCC TCC CCG CTC GGC GCC CGT GCG TCC Pro Pro Ala Ala Pro Thr Arg Ala Ser Pro Leu Gly Ala Arg Ala Ser	120	125	130	558
CCG CCG CGT TCC GGC GTC TCC TTG GCG CGC CCG GCT CCC GGC TGT CCC Pro Pro Arg Ser Gly Val Ser Leu Ala Arg Pro Ala Pro Gly Cys Pro	135	140	145	606
CGC CCG GCG TGC GAG CCG GTG TAT GGG CCC CTC ACC ATG TCG CTG AAG Arg Pro Ala Cys Glu Pro Val Tyr Gly Pro Leu Thr Met Ser Leu Lys	150	155	160	654
CCC CAG CAG CAG CAG CAG CAG CAA CAG CAG CAG CAG CAA CAG Pro Gln	165	170	175	702
CAG CAG CAG CAG CAG CAG CCG CCG CCC GCG GCT GCC AAT GTC CGC Gln Gln Gln Gln Gln Gln Pro Pro Pro Ala Ala Ala Asn Val Arg	185	190	195	750
AAG CCC GGC AGC GGC CTT CTA GCG TCG CCC GCC GCG CCT TCG Lys Pro Gly Gly Ser Gly Leu Leu Ala Ser Pro Ala Ala Pro Ser	200	205	210	798
CCG TCC TCG TCC TCG GTC TCC TCG TCC TCG GCC ACG GCT CCC TCC TCG Pro Ser Ser Ser Ser Val Ser Ser Ser Ala Thr Ala Pro Ser Ser	215	220	225	846
GTG GTC GCG GCG ACC TCC GGC GGC GGG AGG CCC GGC CTG GGC AGA GGT Val Val Ala Ala Thr Ser Gly Gly Arg Pro Gly Leu Gly Arg Gly	230	235	240	894
CGA AAC AGT AAC AAA GGA CTG CCT CAG TCT ACG ATT TCT TTT GAT GGA Arg Asn Ser Asn Lys Gly Leu Pro Gln Ser Thr Ile Ser Phe Asp Gly				942

245	250	255	260	
ATC TAT GCA AAT ATG AGG ATG GTT CAT ATA CTT ACA TCA GTT GTT GGC Ile Tyr Ala Asn Met Arg Met Val His Ile Leu Thr Ser Val Val Gly				990
265	270	275		
TCC AAA TGT GAA GTA CAA GTG AAA AAT GGA GGT ATA TAT GAA GGA GTT Ser Lys Cys Glu Val Gln Val Lys Asn Gly Gly Ile Tyr Glu Gly Val				1038
280	285	290		
TTT AAA ACT TAC AGT CCG AAG TGT GAT TTG GTA CTT GAT GCC GCA CAT Phe Lys Thr Tyr Ser Pro Lys Cys Asp Leu Val Leu Asp Ala Ala His				1086
295	300	305		
GAG AAA AGT ACA GAA TCC AGT TCG GGG CCG AAA CGT GAA GAA ATA ATG Glu Lys Ser Thr Glu Ser Ser Gly Pro Lys Arg Glu Glu Ile Met				1134
310	315	320		
GAG AGT ATT TTG TTC AAA TGT TCA GAC TTT GTT GTG GTA CAG TTT AAA Glu Ser Ile Leu Phe Lys Cys Ser Asp Phe Val Val Val Gln Phe Lys				1182
325	330	335	340	
GAT ATG GAC TCC AGT TAT GCA AAA AGA GAT GCT TTT ACT GAC TCT GCT Asp Met Asp Ser Ser Tyr Ala Lys Arg Asp Ala Phe Thr Asp Ser Ala				1230
345	350	355		
ATC AGT GCT AAA GTG AAT GGC GAA CAC AAA GAG AAG GAC CTG GAG CCC Ile Ser Ala Lys Val Asn Gly Glu His Lys Glu Lys Asp Leu Glu Pro				1278
360	365	370		
TGG GAT GCA GGT GAA CTC ACA GCC AAT GAG GAA CTT GAG GCT TTG GAA Trp Asp Ala Gly Glu Leu Thr Ala Asn Glu Glu Leu Glu Ala Leu Glu				1326
375	380	385		
AAT GAC GTA TCT AAT GGA TGG GAT CCC AAT GAT ATG TTT CGA TAT AAT Asn Asp Val Ser Asn Gly Trp Asp Pro Asn Asp Met Phe Arg Tyr Asn				1374
390	395	400		
GAA GAA AAT TAT GGT GTA GTG TCT ACG TAT GAT AGC AGT TTA TCT TCG Glu Glu Asn Tyr Gly Val Val Ser Thr Tyr Asp Ser Ser Leu Ser Ser				1422
405	410	415	420	
TAT ACA GTG CCC TTA GAA AGA GAT AAC TCA GAA GAA TTT TTA AAA CGG Tyr Thr Val Pro Leu Glu Arg Asp Asn Ser Glu Glu Phe Leu Lys Arg				1470
425	430	435		
GAA GCA AGG GCA AAC CAG TTA GCA GAA GAA ATT GAG TCA AGT GCC CAG Glu Ala Arg Ala Asn Gln Leu Ala Glu Glu Ile Glu Ser Ser Ala Gln				1518
440	445	450		
TAC AAA GCT CGA GTG GCC CTG GAA AAT GAT GAT AGG AGT GAG GAA GAA Tyr Lys Ala Arg Val Ala Leu Glu Asn Asp Asp Arg Ser Glu Glu Glu				1566
455	460	465		

AAA TAC ACA GCA GTT CAG AGA AAT TCC AGT GAA CGT GAG GGG CAC AGC Lys Tyr Thr Ala Val Gln Arg Asn Ser Ser Glu Arg Glu Gly His Ser 470 475 480	1614
ATA AAC ACT AGG GAA AAT AAA TAT ATT CCT CCT GGA CAA AGA AAT AGA Ile Asn Thr Arg Glu Asn Lys Tyr Ile Pro Pro Gly Gln Arg Asn Arg 485 490 495 500	1662
GAA GTC ATA TCC TGG GGA AGT GGG AGA CAG AAT TCA CCG CGT ATG GGC Glu Val Ile Ser Trp Gly Ser Gly Arg Gln Asn Ser Pro Arg Met Gly 505 510 515	1710
CAG CCT GGA TCG GGC TCC ATG CCA TCA AGA TCC ACT TCT CAC ACT TCA Gln Pro Gly Ser Gly Ser Met Pro Ser Arg Ser Thr Ser His Thr Ser 520 525 530	1758
GAT TTC AAC CCG AAT TCT GGT TCA GAC CAA AGA GTA GTT AAT GGA GGT Asp Phe Asn Pro Asn Ser Gly Ser Asp Gln Arg Val Val Asn Gly Gly 535 540 545	1806
GTT CCC TGG CCA TCG CCT TGC CCA TCT CCT TCC TCT CGC CCA CCT TCT Val Pro Trp Pro Ser Pro Cys Pro Ser Pro Ser Arg Pro Pro Ser 550 555 560	1854
CGC TAC CAG TCA GGT CCC AAC TCT CTT CCA CCT CGG GCA GCC ACC CCT Arg Tyr Gln Ser Gly Pro Asn Ser Leu Pro Pro Arg Ala Ala Thr Pro 565 570 575 580	1902
ACA CGG CCG CCC TCC AGG CCC CCC TCG CGG CCA TCC AGA CCC CCG TCT Thr Arg Pro Pro Ser Arg Pro Pro Ser Arg Pro Ser Arg Pro Pro Ser 585 590 595	1950
CAC CCC TCT GCT CAT GGT TCT CCA GCT CCT GTC TCT ACT ATG CCT AAA His Pro Ser Ala His Gly Ser Pro Ala Pro Val Ser Thr Met Pro Lys 600 605 610	1998
CGC ATG TCT TCA GAA GGG CCT CCA AGG ATG TCC CCA AAG GCC CAG CGA Arg Met Ser Ser Glu Gly Pro Pro Arg Met Ser Pro Lys Ala Gln Arg 615 620 625	2046
CAT CCT CGA AAT CAC AGA GTT TCT GCT GGG AGG GGT TCC ATA TCC AGT His Pro Arg Asn His Arg Val Ser Ala Gly Arg Gly Ser Ile Ser Ser 630 635 640	2094
GGC CTA GAA TTT GTA TCC CAC AAC CCA CCC AGT GAA GCA GCT ACT CCT Gly Leu Glu Phe Val Ser His Asn Pro Pro Ser Glu Ala Ala Thr Pro 645 650 655 660	2142
CCA GTA GCA AGG ACC AGT CCC TCG GGG GGA ACG TGG TCA TCA GTG GTC Pro Val Ala Arg Thr Ser Pro Ser Gly Gly Thr Trp Ser Ser Val Val 665 670 675	2190
AGT GGG GTT CCA AGA TTA TCC CCT AAA ACT CAT AGA CCC AGG TCT CCC Ser Gly Val Pro Arg Leu Ser Pro Lys Thr His Arg Pro Arg Ser Pro	2238

680	685	690	
AGA CAG AAC AGT ATT GGA AAT ACC CCC AGT GGG CCA GTT CTT GCT TCT Arg Gln Asn Ser Ile Gly Asn Thr Pro Ser Gly Pro Val Leu Ala Ser			2286
695	700	705	
CCC CAA GCT GGT ATT ATT CCA ACT GAA GCT GTT GCC ATG CCT ATT CCA Pro Gln Ala Gly Ile Ile Pro Thr Glu Ala Val Ala Met Pro Ile Pro			2334
710	715	720	
GCT GCA TCT CCT ACG CCT GCT AGT CCT GCA TCG AAC AGA GCT GTT ACC Ala Ala Ser Pro Thr Pro Ala Ser Pro Ala Ser Asn Arg Ala Val Thr			2382
725	730	735	740
CCT TCT AGT GAG GCT AAA GAT TCC AGG CTT CAA GAT CAG AGG CAG AAC Pro Ser Ser Glu Ala Lys Asp Ser Arg Leu Gln Asp Gln Arg Gln Asn			2430
745	750	755	
TCT CCT GCA GGG AAT AAA GAA AAT ATT AAA CCC AAT GAA ACA TCA CCT Ser Pro Ala Gly Asn Lys Glu Asn Ile Lys Pro Asn Glu Thr Ser Pro			2478
760	765	770	
AGC TTC TCA AAA GCT GAA AAC AAA GGT ATA TCA CCA GTT GTT TCT GAA Ser Phe Ser Lys Ala Glu Asn Lys Gly Ile Ser Pro Val Val Ser Glu			2526
775	780	785	
CAT AGA AAA CAG ATT GAT GAT TTA AAG AAA TTT AAG AAT GAT TTT AGG His Arg Lys Gln Ile Asp Asp Leu Lys Phe Lys Asn Asp Phe Arg			2574
790	795	800	
TTA CAG CCA AGT TCT ACT TCT GAA TCT ATG GAT CAA CTA CTA AAC AAA Leu Gln Pro Ser Ser Thr Ser Glu Ser Met Asp Gln Leu Leu Asn Lys			2622
805	810	815	820
AAT AGA GAG GGA GAA AAA TCA AGA GAT TTG ATC AAA GAC AAA ATT GAA Asn Arg Glu Gly Glu Lys Ser Arg Asp Leu Ile Lys Asp Lys Ile Glu			2670
825	830	835	
CCA AGT GCT AAG GAT TCT TTC ATT GAA AAT AGC AGC AGC AAC TGT ACC Pro Ser Ala Lys Asp Ser Phe Ile Glu Asn Ser Ser Asn Cys Thr			2718
840	845	850	
AGT GGC AGC AGC AAG CCG AAT AGC CCC AGC ATT TCC CCT TCA ATA CTT Ser Gly Ser Ser Lys Pro Asn Ser Pro Ser Ile Ser Pro Ser Ile Leu			2766
855	860	865	
AGT AAC ACG GAG CAC AAG AGG GGA CCT GAG GTC ACT TCC CAA GGG GTT Ser Asn Thr Glu His Lys Arg Gly Pro Glu Val Thr Ser Gln Gly Val			2814
870	875	880	
CAG ACT TCC AGC CCA GCA TGT AAA CAA GAG AAA GAC GAT AAG GAA GAG Gln Thr Ser Ser Pro Ala Cys Lys Gln Glu Lys Asp Asp Lys Glu Glu			2862
885	890	895	900

AAG AAA GAC GCA GCT GAG CAA GTT AGG AAA TCA ACA TTG AAT CCC AAT Lys Lys Asp Ala Ala Glu Gln Val Arg Lys Ser Thr Leu Asn Pro Asn 905 910 915	2910
GCA AAG GAG TTC AAC CCA CGT TCC TTC TCT CAG CCA AAG CCT TCT ACT Ala Lys Glu Phe Asn Pro Arg Ser Phe Ser Gln Pro Lys Pro Ser Thr 920 925 930	2958
ACC CCA ACT TCA CCT CGG CCT CAA GCA CAA CCT AGC CCA TCT ATG GTG Thr Pro Thr Ser Pro Arg Pro Gln Ala Gln Pro Ser Pro Ser Met Val 935 940 945	3006
GGT CAT CAA CAG CCA ACT CCA GTT TAT ACT CAG CCT GTT TGT TTT GCA Gly His Gln Gln Pro Thr Pro Val Tyr Thr Gln Pro Val Cys Phe Ala 950 955 960	3054
CCA AAT ATG ATG TAT CCA GTC CCA GTG AGC CCA GGC GTG CAA CCT TTA Pro Asn Met Met Tyr Pro Val Pro Val Ser Pro Gly Val Gln Pro Leu 965 970 975 980	3102
TAC CCA ATA CCT ATG ACG CCC ATG CCA GTG AAT CAA GCC AAG ACA TAT Tyr Pro Ile Pro Met Thr Pro Met Pro Val Asn Gln Ala Lys Thr Tyr 985 990 995	3150
AGA GCA GTA CCA AAT ATG CCC CAA CAG CGG CAA GAC CAG CAT CAT CAG Arg Ala Val Pro Asn Met Pro Gln Gln Arg Gln Asp Gln His His Gln 1000 1005 1010	3198
AGT GCC ATG ATG CAC CCA GCG TCA GCA GCG GGC CCA CCG ATT GCA GCC Ser Ala Met Met His Pro Ala Ser Ala Ala Gly Pro Pro Ile Ala Ala 1015 1020 1025	3246
ACC CCA CCA GCT TAC TCC ACG CAA TAT GTT GCC TAC AGT CCT CAG CAG Thr Pro Pro Ala Tyr Ser Thr Gln Tyr Val Ala Tyr Ser Pro Gln Gln 1030 1035 1040	3294
TTC CCA AAT CAG CCC CTT GTT CAG CAT GTG CCA CAT TAT CAG TCT CAG Phe Pro Asn Gln Pro Leu Val Gln His Val Pro His Tyr Gln Ser Gln 1045 1050 1055 1060	3342
CAT CCT CAT GTC TAT AGT CCT GTA ATA CAG GGT AAT GCT AGA ATG ATG His Pro His Val Tyr Ser Pro Val Ile Gln Gly Asn Ala Arg Met Met 1065 1070 1075	3390
GCA CCA CCA ACA CAC GCC CAG CCT GGT TTA GTA TCT TCT TCA GCA ACT Ala Pro Pro Thr His Ala Gln Pro Gly Leu Val Ser Ser Ala Thr 1080 1085 1090	3438
CAG TAC GGG GCT CAT GAG CAG ACG CAT GCG ATG TAT GCA TGT CCC AAA Gln Tyr Gly Ala His Glu Gln Thr His Ala Met Tyr Ala Cys Pro Lys 1095 1100 1105	3486
TTA CCA TAC AAC AAG GAG ACA AGC CCT TCT TTC TAC TTT GCC ATT TCC Leu Pro Tyr Asn Lys Glu Thr Ser Pro Ser Phe Tyr Phe Ala Ile Ser	3534

1110	1115	1120	
ACG GGC TCC CTT GCT CAG CAG TAT GCG CAC CCT AAC GCT ACC CTG CAC			3582
Thr Gly Ser Leu Ala Gln Gln Tyr Ala His Pro Asn Ala Thr Leu His			
1125	1130	1135	1140
CCA CAT ACT CCA CAC CCT CAG CCT TCA GCT ACC CCC ACT GGA CAG CAG			3630
Pro His Thr Pro His Pro Gln Pro Ser Ala Thr Pro Thr Gly Gln Gln			
1145	1150	1155	
CAA AGC CAA CAT GGT GGA AGT CAT CCT GCA CCC AGT CCT GTT CAG CAC			3678
Gln Ser Gln His Gly Gly Ser His Pro Ala Pro Ser Pro Val Gln His			
1160	1165	1170	
CAT CAG CAC CAG GCC GCC CAG GCT CTC CAT CTG GCC AGT CCA CAG CAG			3726
His Gln His Gln Ala Ala Gln Ala Leu His Leu Ala Ser Pro Gln Gln			
1175	1180	1185	
CAG TCA GCC ATT TAC CAC GCG GGG CTT GCG CCA ACT CCA CCC TCC ATG			3774
Gln Ser Ala Ile Tyr His Ala Gly Leu Ala Pro Thr Pro Pro Ser Met			
1190	1195	1200	
ACA CCT GCC TCC AAC ACG CAG TCG CCA CAG AAT AGT TTC CCA GCA GCA			3822
Thr Pro Ala Ser Asn Thr Gln Ser Pro Gln Asn Ser Phe Pro Ala Ala			
1205	1210	1215	1220
CAA CAG ACT GTC TTT ACG ATC CAT CCT TCT CAC GTC CAG CCG GCG TAT			3870
Gln Gln Thr Val Phe Thr Ile His Pro Ser His Val Gln Pro Ala Tyr			
1225	1230	1235	
ACC AAC CCA CCC CAC ATG GCC CAC GTA CCT CAG GCT CAT GTA CAG TCA			3918
Thr Asn Pro Pro His Met Ala His Val Pro Gln Ala His Val Gln Ser			
1240	1245	1250	
GGA ATG GTT CCT TCT CAT CCA ACT GCC CAT GCG CCA ATG ATG CTA ATG			3966
Gly Met Val Pro Ser His Pro Thr Ala His Ala Pro Met Met Leu Met			
1255	1260	1265	
ACG ACA CAG CCA CCC GGC GGT CCC CAG GCC GCC CTC GCT CAA AGT GCA			4014
Thr Thr Gln Pro Pro Gly Gly Pro Gln Ala Ala Leu Ala Gln Ser Ala			
1270	1275	1280	
CTA CAG CCC ATT CCA GTC TCG ACA ACA GCG CAT TTC CCC TAT ATG ACG			4062
Leu Gln Pro Ile Pro Val Ser Thr Thr Ala His Phe Pro Tyr Met Thr			
1285	1290	1295	1300
CAC CCT TCA GTA CAA GCC CAC CAC CAA CAG CAG TTG TAAGGCTGCC			4108
His Pro Ser Val Gln Ala His His Gln Gln Leu			
1305	1310		
CTGGAGGAAC CGAAAGGCCA ATTCCCTCC TCCCTCTAC TGCTTCTACC AACTGGAAGC			4168
ACAGAAAAGT AGAATTCAT TTATTTGTT TTTAAAATAT ATATGTTGAT TTCTTGTAAC			4228

ATCCAATAGG AATGCTAAC	GA GTTCAC TTGC AGTGGAA	GAT ACTTG GACCG AGTAGAGGCA	4288
TTTAGGAACT TGGGGC TAT	TCCATAATT CATATGCTGT	TTCAGAGTCC CGCAGGTACC	4348
CCAGCTCTGC TTGCCGAAAC	TGGAAGTTAT TTATTTTTA	ATAACCC TTG AAAGTCATGA	4408
ACACATCAGC TAGCAAAAGA	AGTAACAAGA GTGATTCTTG	CTGCTATTAC TGCTAAAAAA	4468
AAAAAAAAAA AAA			4481

(2) INFORMATION FOR SEQ ID NO:3:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1312 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:

Met Arg Ser Ala Ala Ala Ala Pro Arg Ser Pro Ala Val Ala Thr Glu
 1 5 10 15

Ser Arg Arg Phe Ala Ala Ala Arg Trp Pro Gly Trp Arg Ser Leu Gln
 20 25 30

Arg Pro Ala Arg Arg Ser Gly Arg Gly Gly Gly Ala Ala Pro Gly
 35 40 45

Pro Tyr Pro Ser Ala Ala Pro Pro Pro Pro Gly Pro Gly Pro Pro Pro
 50 55 60

Ser Arg Gln Ser Ser Pro Pro Ser Ala Ser Asp Cys Phe Gly Ser Asn
 65 70 75 80

Gly Asn Gly Gly Gly Ala Phe Arg Pro Gly Ser Arg Arg Leu Leu Gly
 85 90 95

Leu Gly Gly Pro Pro Arg Pro Phe Val Val Val Leu Leu Pro Leu Ala
 100 105 110

Ser Pro Gly Ala Pro Pro Ala Ala Pro Thr Arg Ala Ser Pro Leu Gly
 115 120 125

Ala Arg Ala Ser Pro Pro Arg Ser Gly Val Ser Leu Ala Arg Pro Ala
 130 135 140

Pro Gly Cys Pro Arg Pro Ala Cys Glu Pro Val Tyr Gly Pro Leu Thr
 145 150 155 160

Met Ser Leu Lys Pro Gln Gln Gln Gln Gln Gln Gln Gln Gln
 165 170 175

Gln Gln Gln Gln Gln Gln Gln Gln Gln Pro Pro Pro Ala Ala
180 185 190

Ala Asn Val Arg Lys Pro Gly Gly Ser Gly Leu Leu Ala Ser Pro Ala
195 200 205

Ala Ala Pro Ser Pro Ser Ser Ser Val Ser Ser Ser Ala Thr
210 215 220

Ala Pro Ser Ser Val Val Ala Ala Thr Ser Gly Gly Gly Arg Pro Gly
225 230 235 240

Leu Gly Arg Gly Arg Asn Ser Asn Lys Gly Leu Pro Gln Ser Thr Ile
245 250 255

Ser Phe Asp Gly Ile Tyr Ala Asn Met Arg Met Val His Ile Leu Thr
260 265 270

Ser Val Val Gly Ser Lys Cys Glu Val Gln Val Lys Asn Gly Gly Ile
275 280 285

Tyr Glu Gly Val Phe Lys Thr Tyr Ser Pro Lys Cys Asp Leu Val Leu
290 295 300

Asp Ala Ala His Glu Lys Ser Thr Glu Ser Ser Ser Gly Pro Lys Arg
305 310 315 320

Glu Glu Ile Met Glu Ser Ile Leu Phe Lys Cys Ser Asp Phe Val Val
325 330 335

Val Gln Phe Lys Asp Met Asp Ser Ser Tyr Ala Lys Arg Asp Ala Phe
340 345 350

Thr Asp Ser Ala Ile Ser Ala Lys Val Asn Gly Glu His Lys Glu Lys
355 360 365

Asp Leu Glu Pro Trp Asp Ala Gly Glu Leu Thr Ala Asn Glu Glu Leu
370 375 380

Glu Ala Leu Glu Asn Asp Val Ser Asn Gly Trp Asp Pro Asn Asp Met
385 390 395 400

Phe Arg Tyr Asn Glu Glu Asn Tyr Gly Val Val Ser Thr Tyr Asp Ser
405 410 415

Ser Leu Ser Ser Tyr Thr Val Pro Leu Glu Arg Asp Asn Ser Glu Glu
420 425 430

Phe Leu Lys Arg Glu Ala Arg Ala Asn Gln Leu Ala Glu Glu Ile Glu
435 440 445

Ser Ser Ala Gln Tyr Lys Ala Arg Val Ala Leu Glu Asn Asp Asp Arg
450 455 460

Ser Glu Glu Glu Lys Tyr Thr Ala Val Gln Arg Asn Ser Ser Glu Arg
465 470 475 480

Glu Gly His Ser Ile Asn Thr Arg Glu Asn Lys Tyr Ile Pro Pro Gly
485 490 495

Gln Arg Asn Arg Glu Val Ile Ser Trp Gly Ser Gly Arg Gln Asn Ser
500 505 510

Pro Arg Met Gly Gln Pro Gly Ser Gly Ser Met Pro Ser Arg Ser Thr
515 520 525

Ser His Thr Ser Asp Phe Asn Pro Asn Ser Gly Ser Asp Gln Arg Val
530 535 540

Val Asn Gly Gly Val Pro Trp Pro Ser Pro Cys Pro Ser Pro Ser Ser
545 550 555 560

Arg Pro Pro Ser Arg Tyr Gln Ser Gly Pro Asn Ser Leu Pro Pro Arg
565 570 575

Ala Ala Thr Pro Thr Arg Pro Pro Ser Arg Pro Pro Ser Arg Pro Ser
580 585 590

Arg Pro Pro Ser His Pro Ser Ala His Gly Ser Pro Ala Pro Val Ser
595 600 605

Thr Met Pro Lys Arg Met Ser Ser Glu Gly Pro Pro Arg Met Ser Pro
610 615 620

Lys Ala Gln Arg His Pro Arg Asn His Arg Val Ser Ala Gly Arg Gly
625 630 635 640

Ser Ile Ser Ser Gly Leu Glu Phe Val Ser His Asn Pro Pro Ser Glu
645 650 655

Ala Ala Thr Pro Pro Val Ala Arg Thr Ser Pro Ser Gly Gly Thr Trp
660 665 670

Ser Ser Val Val Ser Gly Val Pro Arg Leu Ser Pro Lys Thr His Arg
675 680 685

Pro Arg Ser Pro Arg Gln Asn Ser Ile Gly Asn Thr Pro Ser Gly Pro
690 695 700

Val Leu Ala Ser Pro Gln Ala Gly Ile Ile Pro Thr Glu Ala Val Ala
705 710 715 720

Met Pro Ile Pro Ala Ala Ser Pro Thr Pro Ala Ser Pro Ala Ser Asn
725 730 735

Arg Ala Val Thr Pro Ser Ser Glu Ala Lys Asp Ser Arg Leu Gln Asp
740 745 750

Gln Arg Gln Asn Ser Pro Ala Gly Asn Lys Glu Asn Ile Lys Pro Asn
755 760 765

Glu Thr Ser Pro Ser Phe Ser Lys Ala Glu Asn Lys Gly Ile Ser Pro
770 775 780

Val Val Ser Glu His Arg Lys Gln Ile Asp Asp Leu Lys Lys Phe Lys
785 790 795 800

Asn Asp Phe Arg Leu Gln Pro Ser Ser Thr Ser Glu Ser Met Asp Gln
805 810 815

Leu Leu Asn Lys Asn Arg Glu Gly Glu Lys Ser Arg Asp Leu Ile Lys
820 825 830

Asp Lys Ile Glu Pro Ser Ala Lys Asp Ser Phe Ile Glu Asn Ser Ser
835 840 845

Ser Asn Cys Thr Ser Gly Ser Ser Lys Pro Asn Ser Pro Ser Ile Ser
850 855 860

Pro Ser Ile Leu Ser Asn Thr Glu His Lys Arg Gly Pro Glu Val Thr
865 870 875 880

Ser Gln Gly Val Gln Thr Ser Ser Pro Ala Cys Lys Gln Glu Lys Asp
885 890 895

Asp Lys Glu Glu Lys Asp Ala Ala Glu Gln Val Arg Lys Ser Thr
900 905 910

Leu Asn Pro Asn Ala Lys Glu Phe Asn Pro Arg Ser Phe Ser Gln Pro
915 920 925

Lys Pro Ser Thr Thr Pro Thr Ser Pro Arg Pro Gln Ala Gln Pro Ser
930 935 940

Pro Ser Met Val Gly His Gln Gln Pro Thr Pro Val Tyr Thr Gln Pro
945 950 955 960

Val Cys Phe Ala Pro Asn Met Met Tyr Pro Val Pro Val Ser Pro Gly
965 970 975

Val Gln Pro Leu Tyr Pro Ile Pro Met Thr Pro Met Pro Val Asn Gln
980 985 990

Ala Lys Thr Tyr Arg Ala Val Pro Asn Met Pro Gln Gln Arg Gln Asp
995 1000 1005

Gln His His Gln Ser Ala Met Met His Pro Ala Ser Ala Ala Gly Pro
1010 1015 1020

Pro Ile Ala Ala Thr Pro Pro Ala Tyr Ser Thr Gln Tyr Val Ala Tyr
1025 1030 1035 1040

Ser Pro Gln Gln Phe Pro Asn Gln Pro Leu Val Gln His Val Pro His
1045 1050 1055

Tyr Gln Ser Gln His Pro His Val Tyr Ser Pro Val Ile Gln Gly Asn
1060 1065 1070

Ala Arg Met Met Ala Pro Pro Thr His Ala Gln Pro Gly Leu Val Ser
1075 1080 1085

Ser Ser Ala Thr Gln Tyr Gly Ala His Glu Gln Thr His Ala Met Tyr
1090 1095 1100

Ala Cys Pro Lys Leu Pro Tyr Asn Lys Glu Thr Ser Pro Ser Phe Tyr
1105 1110 1115 1120

Phe Ala Ile Ser Thr Gly Ser Leu Ala Gln Gln Tyr Ala His Pro Asn
1125 1130 1135

Ala Thr Leu His Pro His Thr Pro His Pro Gln Pro Ser Ala Thr Pro
1140 1145 1150

Thr Gly Gln Gln Gln Ser Gln His Gly Gly Ser His Pro Ala Pro Ser
1155 1160 1165

Pro Val Gln His His Gln His Gln Ala Ala Gln Ala Leu His Leu Ala
1170 1175 1180

Ser Pro Gln Gln Gln Ser Ala Ile Tyr His Ala Gly Leu Ala Pro Thr
1185 1190 1195 1200

Pro Pro Ser Met Thr Pro Ala Ser Asn Thr Gln Ser Pro Gln Asn Ser
1205 1210 1215

Phe Pro Ala Ala Gln Gln Thr Val Phe Thr Ile His Pro Ser His Val
1220 1225 1230

Gln Pro Ala Tyr Thr Asn Pro Pro His Met Ala His Val Pro Gln Ala
1235 1240 1245

His Val Gln Ser Gly Met Val Pro Ser His Pro Thr Ala His Ala Pro
1250 1255 1260

Met Met Leu Met Thr Thr Gln Pro Pro Gly Gly Pro Gln Ala Ala Leu
1265 1270 1275 1280

Ala Gln Ser Ala Leu Gln Pro Ile Pro Val Ser Thr Thr Ala His Phe
1285 1290 1295

Pro Tyr Met Thr His Pro Ser Val Gln Ala His His Gln Gln Leu
1300 1305 1310

(2) INFORMATION FOR SEQ ID NO:4:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1257 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: both

(ii) MOLECULE TYPE: cDNA

(ix) FEATURE:

- (A) NAME/KEY: CDS
- (B) LOCATION: 2..1255

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:4:

G CAC GAG GGG CCG CTC ACC ATG TCG CTG AAG CCG CAG CCG CAG CCG His Glu Gly Pro Leu Thr Met Ser Leu Lys Pro Gln Pro Gln Pro	46
1 5 10 15	
CCC GCG CCC GCC ACT GGC CGC AAG CCC GGC GGC GGC CTG CTC TCG TCG Pro Ala Pro Ala Thr Gly Arg Lys Pro Gly Gly Leu Leu Ser Ser	94
20 25 30	
CCC GGC GCC GCG CCG GCC TCG GCC GCG GTG ACC TCG GCT TCC GTG GTG Pro Gly Ala Ala Pro Ala Ser Ala Ala Val Thr Ser Ala Ser Val Val	142
35 40 45	
CCG GCC CCG GCC GCG CCG GTG GCG TCT TCC TCG GCG GCC GCG GGC GGC Pro Ala Pro Ala Ala Pro Val Ala Ser Ser Ala Ala Ala Gly Gly	190
50 55 60	
GGG CGT CCC GGC CTG GGC AGA GGT CGG AAC AGT AGC AAA GGA CTG CCT Gly Arg Pro Gly Leu Gly Arg Gly Arg Asn Ser Ser Lys Gly Leu Pro	238
65 70 75	
CAG CCT ACG ATT TCT TTT GAT GGA ATC TAT GCA AAC GTG AGG ATG GTT Gln Pro Thr Ile Ser Phe Asp Gly Ile Tyr Ala Asn Val Arg Met Val	286
80 85 90 95	
CAT ATA CTT ACG TCA GTT GTT GGA TCG AAA TGT GAA GTA CAA GTG AAA His Ile Leu Thr Ser Val Val Gly Ser Lys Cys Glu Val Gln Val Lys	334
100 105 110	
AAC GGA GGC ATA TAT GAA GGA GTT TTT AAA ACA TAC AGT CCT AAG TGT Asn Gly Gly Ile Tyr Glu Gly Val Phe Lys Thr Tyr Ser Pro Lys Cys	382
115 120 125	
GAC TTG GTA CTT GAT GCT GCA CAT GAG AAA AGT ACA GAA TCC AGT TCG Asp Leu Val Leu Asp Ala Ala His Glu Lys Ser Thr Glu Ser Ser Ser	430

130	135	140	
GGG CCA AAA CGT GAA GAA ATA ATG GAG AGT GTT TTG TTC AAA TGC TCA Gly Pro Lys Arg Glu Glu Ile Met Glu Ser Val Leu Phe Lys Cys Ser 145	150	155	478
GAC TTC GTT GTG GTA CAG TTT AAA GAT ACA GAC TCC AGT TAT GCA CGG Asp Phe Val Val Val Gln Phe Lys Asp Thr Asp Ser Ser Tyr Ala Arg 160	165	170	526
AGA GAT GCT TTT ACT GAC TCT GCT CTC AGC GCA AAG GTG AAT GGT GAG Arg Asp Ala Phe Thr Asp Ser Ala Leu Ser Ala Lys Val Asn Gly Glu 180	185	190	574
CAC AAG GAG AAG GAC CTG GAG CCC TGG GAT GCA GGG GAG CTC ACG GCC His Lys Glu Lys Asp Leu Glu Pro Trp Asp Ala Gly Glu Leu Thr Ala 195	200	205	622
AGC GAG GAG CTG GAG CTG GAG AAT GAT GTG TCT AAT GGA TGG GAC CCC Ser Glu Glu Leu Glu Leu Asn Asp Val Ser Asn Gly Trp Asp Pro 210	215	220	670
AAT GAC ATG TTT CGA TAT AAT GAA GAG AAT TAT GGT GTG GTG TCC ACA Asn Asp Met Phe Arg Tyr Asn Glu Glu Asn Tyr Gly Val Val Ser Thr 225	230	235	718
TAT GAT AGC AGT TTA TCT TCA TAT ACG GTT CCT TTA GAA AGG GAC AAC Tyr Asp Ser Ser Leu Ser Ser Tyr Thr Val Pro Leu Glu Arg Asp Asn 240	245	250	766
TCA GAA GAA TTT CTT AAA CGG GAG GCA AGG GCA AAC CAG TTA GCA GAA Ser Glu Glu Phe Leu Lys Arg Glu Ala Arg Ala Asn Gln Leu Ala Glu 260	265	270	814
GAA ATT GAA TCC AGT GCT CAG TAC AAA GCT CGT GTC GCC CTT GAG AAT Glu Ile Glu Ser Ser Ala Gln Tyr Lys Ala Arg Val Ala Leu Glu Asn 275	280	285	862
GAT GAC CGG AGT GAG GAA GAA AAA TAC ACA GCA GTC CAG AGA AAC TGC Asp Asp Arg Ser Glu Glu Lys Tyr Thr Ala Val Gln Arg Asn Cys 290	295	300	910
AGT GAC CGG GAG GGG CAT GGC CCC AAC ACT AGG GAC AAT AAA TAT ATT Ser Asp Arg Glu Gly His Gly Pro Asn Thr Arg Asp Asn Lys Tyr Ile 305	310	315	958
CCT CCT GGA CAA AGA AAC AGA GAA GTC CTA TCC TGG GGA AGT GGG AGA Pro Pro Gly Gln Arg Asn Arg Glu Val Leu Ser Trp Gly Ser Gly Arg 320	325	330	1006
CAG AGC TCA CCA CGG ATG GGC CAG CCT GGG CCA GGC TCC ATG CCG TCA Gln Ser Ser Pro Arg Met Gly Gln Pro Gly Pro Gly Ser Met Pro Ser 340	345	350	1054

AGA GCT GCT TCT CAC ACT TCA GAT TTC AAC CCG AAC GCT GGC TCA GAC	1102
Arg Ala Ala Ser His Thr Ser Asp Phe Asn Pro Asn Ala Gly Ser Asp	
355	360
365	
CAA AGA GTA GTT AAT GGA GGT GTT CCC TGG CCA TCG CCT TGC CCA TCT	1150
Gln Arg Val Val Asn Gly Gly Val Pro Trp Pro Ser Pro Cys Pro Ser	
370	375
380	
CCT TCC TCT CGC CCA CCT TCT CGC TAC CAG TCA GGT CCC AAC TCT CTT	1198
Pro Ser Ser Arg Pro Pro Ser Arg Tyr Gln Ser Gly Pro Asn Ser Leu	
385	390
395	
CCA CCT CGG GCA GCC ACC CCT ACA CGG CCT CGT GCC GAA TTC CTG CAG	1246
Pro Pro Arg Ala Ala Thr Pro Thr Arg Pro Arg Ala Glu Phe Leu Gln	
400	405
410	415
CCC GGG GAT CC	1257
Pro Gly Asp	

(2) INFORMATION FOR SEQ ID NO:5:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 418 amino acids
 - (B) TYPE: amino acid
 - (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: protein
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

His Glu Gly Pro Leu Thr Met Ser Leu Lys Pro Gln Pro Gln Pro Pro
 1 5 10 15

Ala Pro Ala Thr Gly Arg Lys Pro Gly Gly Leu Leu Ser Ser Pro
 20 25 30

Gly Ala Ala Pro Ala Ser Ala Ala Val Thr Ser Ala Ser Val Val Pro
 35 40 45

Ala Pro Ala Ala Pro Val Ala Ser Ser Ala Ala Gly Gly Gly
 50 55 60

Arg Pro Gly Leu Gly Arg Gly Arg Asn Ser Ser Lys Gly Leu Pro Gln
 65 70 75 80

Pro Thr Ile Ser Phe Asp Gly Ile Tyr Ala Asn Val Arg Met Val His
 85 90 95

Ile Leu Thr Ser Val Val Gly Ser Lys Cys Glu Val Gln Val Lys Asn
 100 105 110

Gly Gly Ile Tyr Glu Gly Val Phe Lys Thr Tyr Ser Pro Lys Cys Asp

115 120 125
Leu Val Leu Asp Ala Ala His Glu Lys Ser Thr Glu Ser Ser Ser Gly
130 135 140

Pro Lys Arg Glu Glu Ile Met Glu Ser Val Leu Phe Lys Cys Ser Asp
145 150 155 160

Phe Val Val Val Gln Phe Lys Asp Thr Asp Ser Ser Tyr Ala Arg Arg
165 170 175

Asp Ala Phe Thr Asp Ser Ala Leu Ser Ala Lys Val Asn Gly Glu His
180 185 190

Lys Glu Lys Asp Leu Glu Pro Trp Asp Ala Gly Glu Leu Thr Ala Ser
195 200 205

Glu Glu Leu Glu Leu Glu Asn Asp Val Ser Asn Gly Trp Asp Pro Asn
210 215 220

Asp Met Phe Arg Tyr Asn Glu Glu Asn Tyr Gly Val Val Ser Thr Tyr
225 230 235 240

Asp Ser Ser Leu Ser Ser Tyr Thr Val Pro Leu Glu Arg Asp Asn Ser
245 250 255

Glu Glu Phe Leu Lys Arg Glu Ala Arg Ala Asn Gln Leu Ala Glu Glu
260 265 270

Ile Glu Ser Ser Ala Gln Tyr Lys Ala Arg Val Ala Leu Glu Asn Asp
275 280 285

Asp Arg Ser Glu Glu Lys Tyr Thr Ala Val Gln Arg Asn Cys Ser
290 295 300

Asp Arg Glu Gly His Gly Pro Asn Thr Arg Asp Asn Lys Tyr Ile Pro
305 310 315 320

Pro Gly Gln Arg Asn Arg Glu Val Leu Ser Trp Gly Ser Gly Arg Gln
325 330 335

Ser Ser Pro Arg Met Gly Gln Pro Gly Pro Gly Ser Met Pro Ser Arg
340 345 350

Ala Ala Ser His Thr Ser Asp Phe Asn Pro Asn Ala Gly Ser Asp Gln
355 360 365

Arg Val Val Asn Gly Gly Val Pro Trp Pro Ser Pro Cys Pro Ser Pro
370 375 380

Ser Ser Arg Pro Pro Ser Arg Tyr Gln Ser Gly Pro Asn Ser Leu Pro
385 390 395 400

Pro Arg Ala Ala Thr Pro Thr Arg Pro Arg Ala Glu Phe Leu Gln Pro
405 410 415

Gly Asp